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EXAMINER	
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SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/09/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	09/849,662	PADMANABHAN ET AL.	
	Examiner	Art Unit	
	Ashok B. Patel	2154	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 October 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-41* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-41* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-41 are subject to examination.

2. This action is responsive to appeal brief filed on 10/19/2006. In view of the appeal brief filed on 09/08/2006, PROSECUTION IS HEREBY REOPENED. New grounds of rejections are set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) request reinstatement of the appeal.

If reinstatement of the appeal is requested, such request must be accompanied by a supplemental appeal brief, but no new amendments, affidavits (37 CFR 1.130, 1.131 or 1.132) or other evidence are permitted. See 37 CFR 1.193(b)(2).

3. Examiner would like to thank the Applicant for providing the summary on the claimed subject matter, and explanation of the claimed limitations in relation to the specification by reference to Figures, pages and lines. Upon further consideration given to the understanding of the claimed limitations, new grounds of rejection is made as below.

Claim Rejections - 35 USC § 101

4. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. Claims 7, 9, 10, 23, 25, 26, 38, 40 and 41 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

The specification contains intrinsic evidence at page 35 stating that " While the invention has been described above in the general context of software tools and computer-executable instructions of a computer program that runs on a computer and/or computers, those skilled in the art will recognize that the invention also may be implemented in combination with other program modules. Generally, program modules include routines, programs, components, data structures, etc. that perform particular tasks and/or implement particular abstract data types."

Referring to claim 7,

Claim 7 recites "A software tool for...." is not statutory because it is directed to software, per se, lacking storage on a medium, which enables any underlying functionality to occur.

Also Claim 7 recites limitations for "adapted to...." In line 3, 8, 13 and finally "correcting the location estimate.", as such attempting to claim a data structure, however the body of claim lacks the necessary functional interrelationship of the data to be a data structure and therefore the claim is only a collection of data which is non-functional descriptive material which is non statutory, even if the claims were in proper format to have a functional interrelationship, the claims would still be non statutory as a data structure per se, therefore lacks a practical application because it alone cannot produce its intended outcome.

Referring to claims 9 and 10,

Claims 9 and 10 are claims to a "software" which is not statutory because it is directed to software, per se, lacking storage on a medium, which enables any underlying functionality to occur.

Also, Claims 9 and 10 are attempting to claim a data structure, however the body of claim lacks the necessary functional interrelationship of the data to be a data structure and therefore the claim is only a collection of data which is non-functional descriptive material which is non statutory, even if the claims were in proper format to have a functional interrelationship, the claims would still be non statutory as a data structure per se, therefore lacks a practical application because it alone cannot produce its intended outcome.

Referring to claim 23,

Claim 23 recites "A software tool for...." is not statutory because it is directed to software, per se, lacking storage on a medium, which enables any underlying functionality to occur.

Also Claim 23 recites limitations for "adapted to...." In line 3, 7,10, 14 and 15 and finally "a location estimate.", as such attempting to claim a data structure, however the body of claim lacks the necessary functional interrelationship of the data to be a data structure and therefore the claim is only a collection of data which is non-functional descriptive material which is non statutory, even if the claims were in proper format to have a functional interrelationship, the claims would still be non statutory as a data structure per se, therefore lacks a practical application because it alone cannot produce its intended outcome.

Referring to claims 25 and 26,

Claims 25 and 26 are claims to a "software" which is not statutory because it is directed to software, per se, lacking storage on a medium, which enables any underlying functionality to occur.

Also, Claims 25 and 26 are attempting to claim a data structure, however the body of claim lacks the necessary functional interrelationship of the data to be a data structure and therefore the claim is only a collection of data which is non-functional descriptive material which is non statutory, even if the claims were in proper format to have a functional interrelationship, the claims would still be non statutory as a data structure per se, therefore lacks a practical application because it alone cannot produce its intended outcome.

Referring to claim 38,

Claim 38 recites "A software tool for...." is not statutory because it is directed to software, per se, lacking storage on a medium, which enables any underlying functionality to occur.

Also Claim 38 recites limitations for "adapted to...." In line 3, 5, 9, 11 and finally "computing dispersion metric.", as such attempting to claim a data structure, however the body of claim lacks the necessary functional interrelationship of the data to be a data structure and therefore the claim is only a collection of data which is non-functional descriptive material which is non statutory, even if the claims were in proper format to have a functional interrelationship, the claims would still be non statutory as a data structure per se, therefore lacks a practical application because it alone cannot produce

its intended outcome.

Referring to claims 40 and 41,

Claims 40 and 41 are claims to a "software" which is not statutory because it is directed to software, per se, lacking storage on a medium, which enables any underlying functionality to occur.

Also, Claims 40 and 41 are attempting to claim a data structure, however the body of claim lacks the necessary functional interrelationship of the data to be a data structure and therefore the claim is only a collection of data which is non-functional descriptive material which is non statutory, even if the claims were in proper format to have a functional interrelationship, the claims would still be non statutory as a data structure per se, therefore lacks a practical application because it alone cannot produce its intended outcome.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1-11 are rejected under 35 U.S.C. 103(a) as being Unpatentable over Anderson et. al.(US 6, 684, 250) in view of Ahuja et al. (hereinafter Ahuja) (US 6, 981, 055 B1)

Referring to claim 1,

Anderson teaches a computer implemented method (Fig. 1A, element "GEOLOCATION SYSTEM") of determining the location of as Internet host (ABSTRACT, "An estimated geographic location is selected from the plurality of geographic locations as being a best estimate of a true geographic location of the network address (Internet host), where the selection of the estimated geographic location is based upon a degree of confidence-factor weighted agreement within the plurality of geographic locations.") using a computer system,, comprising the following computer executable acts (col.16, line 29-35, "In an alternative embodiment of the present invention, no distinction is made between exact and inexact processes (as shown in FIG. 11), and all processes are regarded as being located on a common tier. The method 70 is performed by the analysis module 28, and employs each of the algorithms 61, 63 and 65."):

obtaining route information (col. 15, line 32, "As described above, each of the data collection agents 18 may implement one of multiple data collection processes to obtain raw geolocation information. These data collection processes may, in one exemplary embodiment of the present invention, access any one or more of the following data sources:") relating to a network path between a host IP address associated with the Internet host and the computer system, wherein the network path comprises the computer system, the Internet host, and at least one intermediate network node (col. 15, line 55-60, "Traceroute: A traceroute shows the route of a data packet from a data collection machine to a target host. Much information can be derived from the analysis of a traceroute. For instance, if hop #10 is in California, and

hop #13 is in California, then with increased certainty, it can be inferred that hops #11 and #12 are also in California."), and wherein the route information comprises a plurality of router labels associated with the host IP address and the at least one intermediate network node (col.8, line 14-20, "Typically, most network addresses (e.g., IP addresses) are associated with a particular geographic location. This is because routers that receive packets for a particular set of machines are fixed in location and have a fixed set of network addresses for which they receive packets. The machines that routers receive packets for tend to be geographically proximal to the routers.");

extracting a location code from the route information corresponding to a router label associated with one of the Internet host and an intermediate network node proximate the Internet host (col. 52, line49-col. 53, line 16, "EXAMPLE 1 The last four hops in a traceroute form a <u>distal-proximal</u> relationship, meaning that the next hop is geographically closer to its next successive hop: <u>Hop 5 is closer to hop 6 Hop 6 is closer to hop 7 Hop 7 is closer to hop 8</u> Thus, the traced route geographically progresses toward the final hop 8, leading to a decision that the destination is located within a certain range of accuracy. EXAMPLE 2 The point of origin is Denver, Colo., and the destination is Salt Lake City, Utah. The last four hops indicate a connection that is back-hauled through Denver, Colo., essentially geographically backtracking the route taken: 1 Denver Router 2 Grand Junction Router 3 Provo Utah Router 4 Salt Lake City Router 5 Salt Lake City Router 6 Denver Router 7 Provo Utah Router 8 Salt Lake City Router 9 Salt Lake City Destination This example indicates a geographic progression away from Denver toward Utah, directly back to Denver, and finally directly back to Utah

with a destination that does not leave Utah. Thus, a human may assume that even though the route taken was very indirect, it did terminate in Utah. Using Latitude/Longitude coordinates, the data collection agents 18 will see the same scenario and arrive at an intelligent conclusion.")

consulting a data store comprising at least one data set having location codes and corresponding location information (Fig. 1A, elements 26 and 30, col. 10, line 39-42, "If the search was successful, this information will be placed directly into the data collection database 26, at which time the analysis module 28 will determine an estimated geolocation of the searched addresses.");

obtaining location information from the data store corresponding to the location code associated with the one of the Internet host and the intermediate network node proximate the Internet host (col.8, line 14-31, " For example, a traceroute search is conducted by a data collection agent 18 responsive to a search request received at a data collection agent 18 from a data collection broker 22. Each data collection agent 18, responsive to a request, will perform a search (e.g., a traceroute) to collect specified data, and determine the validity of the raw data utilizing built-in metrics. If successful, this data is provided to the data collection database 26, via a data collection broker 22, for analysis by the analysis module 28. Each data collection agent 18 further advises a controlling data collection broker 22 of the success or failure of a particular search." Note: Database 26 of Fig. 2 has location information provided by collection agents along with it's metrics., col. 11, line 20-22 "At block 54, the analysis module 28 processes the

newly entered data within the data collection database 26, and writes this data to the data warehouse 30.");

providing a location estimate of the location of the Internet host according to the location information from the data store corresponding to the location code (col. 15, line 27-29, "As described above, each of the data collection agents 18 may implement one of multiple data collection processes to obtain raw geolocation information.", col. 14, line 1-3, ""Each data collection broker 22 further stores raw data (geolocation information) into the data collection database 26,.");

Although, Anderson teaches "selectively correcting the location estimate" (Fig. 4A, element "REFINED GEOLOCATION DATA", and use of process "latency calculations" at col. 17, line 42-48 by stating, "Moving on to FIG. 9B, at block 86, one or more "exact" geographic location processes (e.g., traceroutes, latency calculations, hostname matching and the DNS Loc LDM) are run to determine whether geolocation information can be determined for the subject network address, and optionally for other network addresses of the block of network addresses.", and col. 21, line 53-56, "This technique of "divide and conquer", combined with more selective pinging/tracerouting allows the subnet blocking algorithm to create a reduced impression in security logs of networks."col.3, line 11-24, Note: "comparing"), Anderson specifically fails to determining a delay time associated with a transmission from the computer system to receipt of the transmission at the Internet host along the network path; and the location estimate according to the delay time associated with the network path.

Ahuja teaches the method of estimating location of a distance at Figs. 3-7 and at col. 8, line 4-63, "Referring to FIG. 3 for example, the observed latency to an IP address from a single source 200 can be converted to an approximation of the distance between the source 200 and the destination IP address 202. The estimated distance D is determined by combining the observed latency, such as 53 ms in the example shown, with an estimate of the speed (in distance per time) of the packets. For example, in fiber-optic cables, packets are known to travel at roughly two-thirds the speed of light in a vacuum. This rate will be affected by several factors including changes in the physical medium, curvature in the network paths, and latency added by routers or other devices. (determining a delay time associated with a transmission from the computer system to receipt of the transmission at the Internet host along the network path;) Given these variations, it is more reliable to determine the average rate through statistical observations than through analysis. An upper bound of this speed is easy to specify, however, since no packets can move faster than the speed of light. In this context, latency to a subnetwork is again defined as the average of the latencies to some set of representative IP addresses in that subnetwork. Once the distance is estimated between a source and the destination, a circle can be defined with radius equal to that distance and with a center located at the geographic location of the source. This is illustrated by circle 204 in FIG. 4 wherein source 200 is in the center and the radius of the circle is distance estimate D."(the location estimate according to the delay time associated with the network path.)

Therefore it would have been an obvious to one of an ordinary skill in art, having the teachings of Anderson and Ahuja in front of him at the time of invention was made, to incorporate teachings of Ahuja as one of "LOCATION DETERMINATION MODULES" as part of the "tiered estimation of geolocation of the internet host employing a number of processes of Anderson as shown in Fig. 11 of Anderson as shown in Fig. 11 such that estimation of the location of the internet host can be refined (corrected) as stated in Fig. 4A.

This would have been obvious because Ahuja states at col. 7, line 60-65, "Note that the topological location of an IP address can often be determined using the standard "traceroute" tool, which attempts to identify all of the router hops on a path selected to reach a destination. However, traceroute frequently provides incomplete information, particularly, because many routers do not respond to traceroute."

Referring to claim 2,

Anderson teaches the method of claim 1, further comprising extracting the location code by examining the router labels in route order along the path from the host to the computer system until a location code is found that is usable to obtain location information from the data store (col. 21, line 21-28, (col. 52, line49-col. 53, line 16, "EXAMPLE 1 The last four hops in a traceroute form a distal-proximal relationship, meaning that the next hop is geographically closer to its next successive hop: Hop 5 is closer to hop 6 Hop 6 is closer to hop 7 Hop 7 is closer to hop 8 Thus, the traced route geographically progresses toward the final hop 8, leading to a decision that the destination is located within a certain range of accuracy. EXAMPLE 2 The point of origin

is Denver, Colo., and the destination is Salt Lake City, Utah. The last four hops indicate a connection that is back-hauled through Denver, Colo., essentially geographically backtracking the route taken: 1 Denver Router 2 Grand Junction Router 3 Provo Utah Router 4 Salt Lake City Router 5 Salt Lake City Router 6 Denver Router 7 Provo Utah Router 8 Salt Lake City Router 9 Salt Lake City Destination This example indicates a geographic progression away from Denver toward Utah, directly back to Denver, and finally directly back to Utah with a destination that does not leave Utah. Thus, a human may assume that even though the route taken was very indirect, it did terminate in Utah. Using Latitude/Longitude coordinates, the data collection agents 18 will see the same scenario and arrive at an intelligent conclusion.").

Referring to claim 3,

Anderson teaches the method of claim 2, further comprising: determining a confidence metric representative of the accuracy of the location estimate; and selectively providing the location estimate of the location of the Internet host if the confidence metric exceeds a threshold. (col. 17, line 42-53, col. 3, line 25-31, "In a further exemplary embodiment, the selecting of the estimated geographic location may include collapsing at least some of the confidence factors associated with the geographic locations into a confirmation confidence factor.(determining a confidence metric representative of the accuracy of the location estimate) The collapsing may comprise combining the plurality of confidence factors for a geographic location that exhibit a correspondence.", Fig. 25, elements 382-388, (selectively providing the

location estimate of the location of the Internet host if the confidence metric exceeds a threshold.))

Referring to claim 4,

Anderson teaches the method of claim 3, further comprising: determining a confidence metric representative of the accuracy of the location estimate between the Internet host and the network node associated with the location estimate. (col. 21, line 53-56, Fig. 25, elements 382-388,col. 46, line 8-23, “The choice of the "best estimate" location determinant at block 388 is performed by identifying the location determinant that exhibits a highest degree of confidence factor-weighted agreement with all the other location determinants.”)

Although, Anderson teaches at Fig. 4A, element “REFINED GEOLOCATION DATA”, and use of process “latency calculations” at col. 17, line 42-48 by stating, “Moving on to FIG. 9B, at block 86, one or more "exact" geographic location processes (e.g., traceroutes, latency calculations, hostname matching and the DNS Loc LDM) are run to determine whether geolocation information can be determined for the subject network address, and optionally for other network addresses of the block of network addresses.”, and col. 21, line 53-56, “This technique of "divide and conquer", combined with more selective pinging/tracerouting allows the subnet blocking algorithm to create a reduced impression in security logs of networks.”col.3, line 11-24, Note: “comparing”), Anderson specifically fails to determining a confidence metric representative of the accuracy of the location estimate based upon the delay time between the Internet host and the network node associated with the location estimate.

Ahuja teaches the method of estimating location of a distance at Figs. 3-7 and at col. 8, line 4-63, "Referring to FIG. 3 for example, the observed latency to an IP address from a single source 200 can be converted to an approximation of the distance between the source 200 and the destination IP address 202. The estimated distance D is determined by combining the observed latency, such as 53 ms in the example shown, with an estimate of the speed (in distance per time) of the packets. For example, in fiber-optic cables, packets are known to travel at roughly two-thirds the speed of light in a vacuum. This rate will be affected by several factors including changes in the physical medium, curvature in the network paths, and latency added by routers or other devices. Given these variations, it is more reliable to determine the average rate through statistical observations than through analysis. An upper bound of this speed is easy to specify, however, since no packets can move faster than the speed of light. In this context, latency to a subnetwork is again defined as the average of the latencies to some set of representative IP addresses in that subnetwork. Once the distance is estimated between a source and the destination, a circle can be defined with radius equal to that distance and with a center located at the geographic location of the source. This is illustrated by circle 204 in FIG. 4 wherein source 200 is in the center and the radius of the circle is distance estimate D."

Ahuja also teaches at col. , line, "After estimating the geographic location of each destination, an estimate of the distance between all pairs of destinations can be easily computed. If the distance between two destinations is extremely small, then it may be reasonably accurate to only measure the performance to one of the destinations and to

assume that the other destination will have the same performance. The accuracy of this inference depends on how close the two points are to each other, both topologically and geographically. However, if they are geographically very close, they are more likely to be topologically close. Therefore, the confidence in the inference should increase as the distance between the two points decreases." (a confidence metric representative of the accuracy of the location estimate based upon the delay time).

Therefore it would have been an obvious to one of an ordinary skill in art, having the teachings of Anderson and Ahuja in front of him at the time of invention was made, to incorporate teachings of Ahuja as one of "LOCATION DETERMINATION MODULES" as part of the "tiered estimation of geolocation of the internet host employing a number of processes of Anderson as shown in Fig. 11 of Anderson as shown in Fig. 11 such that estimation of the location of the internet host can be refined (corrected) as stated in Fig. 4A.

This would have been obvious because Ahuja states at col. 7, line 60-65, "Note that the topological location of an IP address can often be determined using the standard "traceroute" tool, which attempts to identify all of the router hops on a path selected to reach a destination. However, traceroute frequently provides incomplete information, particularly, because many routers do not respond to traceroute."

Referring to claim 5,

Anderson teaches the method of claim 1, further comprising:

obtaining route information (col. 15, line 32, "As described above, each of the data collection agents 18 may implement one of multiple data collection processes to

obtain raw geolocation information. These data collection processes may, in one exemplary embodiment of the present invention, access any one or more of the following data sources:") relating to each network path between the host IP address and each of a plurality of computer systems (col. 15, line 55-60, "Traceroute: A traceroute shows the route of a data packet from a data collection machine to a target host. Much information can be derived from the analysis of a traceroute. For instance, if hop #10 is in California, and hop #13 is in California, then with increased certainty, it can be inferred that hops #11 and #12 are also in California."), wherein the route information comprises a plurality of router labels associated with the host IP address, and each of the plurality of computer systems, and at least one intermediate network node in each network path; (col.8, line 14-20, "Typically, most network addresses (e.g., IP addresses) are associated with a particular geographic location. This is because routers that receive packets for a particular set of machines are fixed in location and have a fixed set of network addresses for which they receive packets. The machines that routers receive packets for tend to be geographically proximal to the routers.", col. 52, line 42-col.53, line 16);

extracting a location code for each network path from the route information corresponding to a router label associated with one of the Internet host and the at least one intermediate network node in each network path; (col. 52, line49-col. 53, line 16, "EXAMPLE 1 The last four hops in a traceroute form a distal-proximal relationship, meaning that the next hop is geographically closer to its next successive hop: Hop 5 is closer to hop 6 Hop 6 is closer to hop 7 Hop 7 is closer to hop 8 Thus, the traced route

geographically progresses toward the final hop 8, leading to a decision that the destination is located within a certain range of accuracy. EXAMPLE 2 The point of origin is Denver, Colo., and the destination is Salt Lake City, Utah. The last four hops indicate a connection that is back-hauled through Denver, Colo., essentially geographically backtracking the route taken: 1 Denver Router 2 Grand Junction Router 3 Provo Utah Router 4 Salt Lake City Router 5 Salt Lake City Router 6 Denver Router 7 Provo Utah Router 8 Salt Lake City Router 9 Salt Lake City Destination This example indicates a geographic progression away from Denver toward Utah, directly back to Denver, and finally directly back to Utah with a destination that does not leave Utah. Thus, a human may assume that even though the route taken was very indirect, it did terminate in Utah. Using Latitude/Longitude coordinates, the data collection agents 18 will see the same scenario and arrive at an intelligent conclusion." ,col. 52, line 42-col.53, line 16))

obtaining location information from the data store corresponding to each location code (Fig. 1A, elements 26 and 30, col. 10, line 39-42, "If the search was successful, this information will be placed directly into the <u>data collection database 26</u>, at which time the analysis module 28 will <u>determine</u> an estimated geolocation of the searched addresses.");

providing a plurality of location estimates of the location of the Internet host according to the location information from the data store corresponding to each location code (col. 15, line 27-29, "As described above, each of the data collection agents 18 may implement one of multiple data collection processes to obtain <u>raw geolocation information</u>.", col. 14, line 1-3, ""Each data collection broker 22 further stores raw data

(geolocation information) into the data collection database 26,.", col. 52, line 42-col.53, line 16));

and correlating at least two of the location estimates to provide an improved location estimate of the location of the Internet host. (col. 21, line 53-56, col. 17, line 42-53, col. 3, line 25-31, "In a further exemplary embodiment, the selecting of the estimated geographic location may include collapsing at least some of the confidence factors associated with the geographic locations into a confirmation confidence factor.(determining a confidence metric representative of the accuracy of the location estimate) The collapsing may comprise combining the plurality of confidence factors for a geographic location that exhibit a correspondence.", Fig. 25, elements 382-388,)

Referring to claim 6,

Anderson teaches the method of claim 1, wherein the location code comprises one of a city code, and airport code, and a country code, and wherein obtaining the route information comprises using a traceroute tool. (col. 29, line 44-65)

Referring to claim 7,

Claim 7 is a claim to a software tool for carrying out the method steps of claim 1. Therefore claim 7 is rejected for the reasons set forth for claim 1.

Referring to claim 8,

Claim 8 is a claim to a computer-readable medium having computer executable instructions for carrying out the method steps of claim 1. Therefore claim 8 is rejected for the reasons set forth for claim 1.

Referring to claim 9,

Claim 8 is a claim to a system for carrying out the method steps of claim 1. Therefore claim 8 is rejected for the reasons set forth for claim 1.

Referring to claim 10,

Claim 10 is a claim for geographical location estimate data associated with an Internet host, the estimate data resulting from a process that includes the method of claim 1. Therefore claim 10 is rejected for the reasons set forth for claim 1.

Referring to claim 11,

Claim 11 is a claim to method that includes the method steps of claim 1 (using multiple computer systems). Therefore claim 11 is rejected for the reasons set forth for claim 1.

7. Claims 14-22 and 27-41 are rejected under 35 U.S.C. 103(a) as being Unpatentable over Ahuja et al. (hereinafter Ahuja) (US 6, 981, 055 B1) in view of Anderson et. al.(US 6, 684, 250)

Referring to claim 14,

Ahuja teaches the method of claim 12, wherein correlating the first, second, and third delay times (This is also illustrated in FIG. 6, wherein destination 202 lies within the intersection of circles 204, 210, 212). Let us note the teachings of Ahuja at col. 6, line62-67, "Performance and other path characteristics as described above will generally be measured by probing to specific IP addresses using the path offered by a specific next-hop AS. However, routing on the Internet is specified at the granularity of subnetworks (also known as prefixes), which are ranges of IP addresses.) comprises: a data store comprising N sets of first, second, and third delay measurements between the first, second, and third computer systems, respectively, and N known hosts, as well

as location information associated with the N known hosts, wherein N is an integer, (col. 9, line 19- col. 10, line 40, "For example, referring to FIG. 7, if there are three prefixes, PR1, PR2, and PR3, and if latency or measurements of other path characteristics have been made from some source AS1 to each of PR1 and PR2 using a specific next-hop AS2, then it is possible to infer the latency or path characteristic to PR3 using the path offered by AS2. Let L(AS_X, AS_Y, PR_Z) represent the latency from the AS AS_X to the prefix PR_Z when the path offered by AS_Y is used. Also let D(PR_X, PR_Y) represent the distance between prefix PR_X and prefix PR_Y. It is possible to infer the latency from AS1 to PR3 using AS2 as the next-hop AS using the equation ##EQU1## Although measurements to only two prefixes were used in this example, in practice a large number of measurements should be used to make any single inference(a data store comprising N sets of first, second, and third delay measurements between the first, second, and third computer systems, respectively, and N known hosts, <u>and</u> "the first, second, and third delay times <u>with the N sets of</u> first, second, and third delay <u>measurements</u>)....."However, an AS may be connected to multiple ASes and, therefore, it is likely that more than one next-hop AS will be available for sending traffic to a destination. Therefore, for further clarification, if L(AS1, AS3, PR3) were being inferred, then the measurements would also have to use AS3 as the next hop. A similar computation would be carried out for each of the next-hop ASes.", and "1. Monitoring sets of prefixes and then treating all prefixes in the set in the same fashion. 2. Aggregating prefix sets based on similarities and treating all such aggregated prefix sets in the same fashion.........4. Placing prefixes into sets based on some criteria of

similarity such as, but not limited to, performance, geographical location(determining a set of first, second, and third delay measurements; and providing a location estimate of the Internet host), and other correlation factors, and treating all prefixes in the sets in the same fashion.".

Ahuja fails to teach consulting such a data store and performing a comparison of the first, second, and third delay times with the N sets of first, second, and third delay measurements in the data store; determining a nearest set of first, second, and third delay measurements according to the comparison; and providing a location estimate of the Internet host .

Anderson teaches at Fig. 4A, element "REFINED GEOLOCATION DATA", and use of process "latency calculations" at col. 17, line 42-48 by stating, "Moving on to FIG. 9B, at block 86, one or more "exact" geographic location processes (e.g., traceroutes, latency calculations, hostname matching and the DNS Loc LDM) are run to determine whether geolocation information can be determined for the subject network address, and optionally for other network addresses of the block of network addresses." And Anderson teaches at col. 3, line 17-20, "The selection of the estimated geographic location may, for example, include comparing each of the plurality of geographic locations potentially associated with the network address against at least some of the further geographic locations of the plurality of geographic locations." (consulting such a data store and performing a comparison of the first, second, and third delay times with the N sets of first, second, and third delay measurements in the data store; determining

a nearest set of first, second, and third delay measurements according to the comparison; and providing a location estimate of the Internet host .)

Therefore it would have been an obvious to one of an ordinary skill in art, having the teachings of Anderson and Ahuja in front of him at the time of invention was made, to incorporate teachings of Ahuja as one of "LOCATION DETERMINATION MODULES" as part of the "tiered estimation of geolocation of the internet host employing a number of processes of Anderson as shown in Fig. 11 of Anderson as shown in Fig. 11 such that estimation of the location of the internet host can be refined (corrected) as stated in Fig. 4A.

This would have been obvious because Ahuja states at col. 7, line 60-65, "Note that the topological location of an IP address can often be determined using the standard "traceroute" tool, which attempts to identify all of the router hops on a path selected to reach a destination. However, traceroute frequently provides incomplete information, particularly, because many routers do not respond to traceroute."

Referring to claim 15,

Ahuja teaches the method of claim 14 of the first, second, and third delay times with the N sets of first, second, and third delay measurements (Figs. 3-7) comprises determining N Euclidian distances corresponding to the Euclidian distances between the N sets of first, second, and third delay measurements in the data store and the first, second, and third delay times, (col. 8, line 31-33, "For example, FIG. 5 shows three sources 200, 206, 208 having distance estimates D1, D2, and D3 to destination 202, respectively.") and wherein providing a location estimate of the Internet host according

to set of fist, second, and third delay measurements comprises selecting location information associated with the set of first, second, and third delay measurements associated with the Euclidian distance as the location estimate. (col. 9, line 19- col. 10, line 40, "For example, referring to FIG. 7, if there are three prefixes, PR1, PR2, and PR3, and if latency or measurements of other path characteristics have been made from some source AS1 to each of PR1 and PR2 using a specific next-hop AS2, then it is possible to infer the latency or path characteristic to PR3 using the path offered by AS2. Let L(AS_X, AS_Y, PR_Z) represent the latency from the AS AS_X to the prefix PR_Z when the path offered by AS_Y is used. Also let D(PR_X, PR_Y) represent the distance between prefix PR_X and prefix PR_Y. It is possible to infer the latency from AS1 to PR3 using AS2 as the next-hop AS using the equation ##EQU1## Although measurements to only two prefixes were used in this example, in practice a large number of measurements should be used to make any single inference."..................."However, an AS may be connected to multiple ASes and, therefore, it is likely that more than one next-hop AS will be available for sending traffic to a destination. Therefore, for further clarification, if L(AS1, AS3, PR3) were being inferred, then the measurements would also have to use AS3 as the next hop. A similar computation would be carried out for each of the next-hop ASes.", and "1. Monitoring sets of prefixes and then treating all prefixes in the set in the same fashion. 2. Aggregating prefix sets based on similarities and treating all such aggregated prefix sets in the same fashion.........4. Placing prefixes into sets based on some criteria of

similarity such as, but not limited to, performance, geographical location and other correlation factors, and treating all prefixes in the sets in the same fashion.".

Ahuja fails to teach wherein performing the comparison of the first, second, and third delay times with the N sets of first, second, and third delay measurements in the data store comprises determining N Euclidian distances corresponding to the Euclidian distances between the N sets of first, second, and third delay measurements in the data store and the first, second, and third delay times, and wherein providing a location estimate of the Internet host according to the nearest set of fist, second, and third delay measurements comprises selecting location information associated with the set of first, second, and third delay measurements in the data store associated with the smallest Euclidian distance as the location estimate.

Anderson teaches at Fig. 4A, element "REFINED GEOLOCATION DATA", and use of process "latency calculations" at col. 17, line 42-48 by stating, "Moving on to FIG. 9B, at block 86, one or more "exact" geographic location processes (e.g., traceroutes, latency calculations, hostname matching and the DNS Loc LDM) are run to determine whether geolocation information can be determined for the subject network address, and optionally for other network addresses of the block of network addresses." And Anderson teaches at col. 3, line 17-20, "The selection of the estimated geographic location may, for example, include comparing each of the plurality of geographic locations potentially associated with the network address against at least some of the further geographic locations of the plurality of geographic locations.", col. 42, line 40-45, "Comments: An exemplary embodiment of the confidence map 332 is illustrated in FIG.

21B. This confidence map 332 gives relatively high confidence factors if and only if the hosts are close together (in the traceroute) and at the end of the traceroute. Other scenarios receive low or zero confidence factors."col. 40, line 37-65, col. 42, line 46-54). (wherein performing the comparison of the first, second, and third delay times with the N sets of first, second, and third delay measurements in the data store comprises determining N Euclidian distances corresponding to the Euclidian distances between the N sets of first, second, and third delay measurements in the data store and the first, second, and third delay times, and wherein providing a location estimate of the Internet host according to the nearest set of fist, second, and third delay measurements comprises selecting location information associated with the set of first, second, and third delay measurements in the data store associated with the smallest Euclidian distance as the location estimate.)

Therefore it would have been an obvious to one of an ordinary skill in art, having the teachings of Anderson and Ahuja in front of him at the time of invention was made, to incorporate teachings of Ahuja as one of "LOCATION DETERMINATION MODULES" as part of the "tiered estimation of geolocation of the internet host employing a number of processes of Anderson as shown in Fig. 11 such that estimation of the location of the internet host can be refined (corrected) as stated in Fig. 4A.

This would have been obvious because Ahuja states at col. 7, line 60-65, "Note that the topological location of an IP address can often be determined using the standard "traceroute" tool, which attempts to identify all of the router hops on a path

selected to reach a destination. However, traceroute frequently provides incomplete information, particularly, because many routers do not respond to traceroute."

Referring to claims 16,

Keeping in mind the teachings of Ahuja as stated above for claim 12, wherein Ahuja teaches the method of claim 12, wherein correlating the fast, second, and third delay times (Figs. 3-7) , however, Ahuja fails to teach computing a first probability density function establishing a relationship between a first network delay associated with the first computer system and a first distance from the first computer system; determining a first distance estimate representative of the distance between the first computer system and the location of the Internet host using the first delay time and the first probability density function; computing a second probability density function establishing a relationship between a second network delay associated with the second computer system and a second distance from the second computer system; determining a second distance estimate representative of the distance between the second computer system and the location of the Internet host using the second delay time and the second probability density function; computing a third probability density function establishing a relationship between a third network delay associated with the third computer system and a third distance from, the third computer system; and determining a third distance estimate representative of the distance between the third computer system and the location of the Internet host using the third delay time and the third probability density function; and wherein providing the location estimate comprises triangulating the first, second, and third distance estimates.

Anderson teaches a concept and a method of calculating the probability density associated with each number of possible locations, which is of a paramount importance at col. 23, line 7-26, "In one embodiment, the unified mapping process 61 takes into account all information available from such methodologies, and a probability (or confidence factor) associated with each, and establishes a unique location. The associated probability that serves as a confidence factor for the unique location. In one embodiment, the unified mapping process 61 is implemented as a Bayesian network that takes into account information regarding possible city and the state locations, results conflicts (e.g., there may be contradictory city/city indications or inconsistent cities/state combinations, and calculates) a final unique location and the associated probability. A probability for each of a number of possible locations that are inputted to the unified mapping process 61 is calculated utilizing the Bayesian network, in one exemplary embodiment of the present invention. For example, if there is one possible location with a very high probability and a number of other possible locations with smaller probabilities, the location with the highest probability may be picked, and its associated probability returned." (computing a probability density function establishing a relationship between the computer system and a distance from, the computer system; and determining a distance estimate representative of the distance between the computer system and the location of the Internet host using the probability density function)

Anderson also teaches at col. 15, line 8-13, "The analysis module 28, according to one exemplary embodiment, operates to extract raw data from the data collection

database 26, process the data according to one or more analysis algorithms (or modules) to generate a location probability table, and to store results and the raw data into the data warehouse 30., "col. 9, line 25-29, "In the manner described in further detail below, the data collection and analysis system 12 generates a location determinant, indicating at least one geographic location, and an associated location probability table, that is communicated back to the customer. (computing a probability density function establishing a relationship between the computer system and all information available from the methodologies as stated above, and a distance from the computer system).

Anderson also teaches the concept and "triangulation" technique at col. 53, line 17-31, Triangulation Using a translation process, in one exemplary embodiment of the present invention, an approximate radius containing the target network address be generated. Launching a latitude/longitude route discovery from geographically disperse locations, the final destination will likely proceed through the same set of routers. Thus, if the final 3 hops leading up to the point of entry into the destination network are proximal, or at the very least, form a line toward the destination's point of entry, one may assume that the destination resides within the common latitude/longitude coordinates. Using the attitude/latitude coordinates of other known landmarks allows a radius to be computed. Within this radius, metro areas and large cities will be known." (wherein providing the location estimate comprises triangulating the first, second, and third distance estimates.) (please also refer to additional teachings substantiating the probability density function calculation for all information available from the

methodologies used for determining the geolocation of the host at col. 14, line 25-40, col. 21, 53-56, col. 16, line 21-35, col. 14, line 25-35, col. 53, line 17-col. 54, line 5).

Therefore it would have been an obvious to one of an ordinary skill in art, having the teachings of Anderson and Ahuja in front of him at the time of invention was made, to incorporate teachings of Ahuja as one of "LOCATION DETERMINATION MODULES" as part of the "tiered estimation of geolocation of the internet host employing a number of processes of Anderson as shown in Fig. 11 such that estimation of the location of the internet host can be refined (corrected) as stated in Fig. 4A.

This would have been obvious because Ahuja states at col. 7, line 60-65, "Note that the topological location of an IP address can often be determined using the standard "traceroute" tool, which attempts to identify all of the router hops on a path selected to reach a destination. However, traceroute frequently provides incomplete information, particularly, because many routers do not respond to traceroute."

Referring to claims 17,

Keeping in mind the teachings of Ahuja as stated above for claim 16, Ahuja fails to teach wherein determining the first, second, and third distance estimates further comprises computing an error function over a location space, and determining coordinates within the location space where the error function is minimized.

Anderson teaches the method of claim 16, wherein determining the first, second, and third distance estimates further comprises computing an error function over a location space, and determining coordinates within the location space where the error

function is minimized. (col. 15, line 52-54, "DNS Loc Record: Occasionally, a DNS Location (Loc for short) record is stored, which indicates the precise latitude, longitude, and elevation of a host (coordinates within the location space).", col. 23, line 7-26The unified mapping process 61 operates to combine the results of a number of mapping methodologies that do not yielded exact results (e.g., combines the results of the inexact algorithms). In one embodiment, the unified mapping process 61 takes into account all information available from such methodologies, and a probability (or confidence factor) associated with each, and establishes a unique location. .The associated probability that serves as a confidence factor for the unique location", col. 52, line 28-35, "In one embodiment of the present invention, a latitude and longitude matching process may be utilized used to assist in the determination the geographic location of a given record. Only a network address (e.g., and IP address) is required for the longitude and latitude matching process to be successful. However, additional information, such as the owner's location, or proximal routers, may be utilized to achieve a higher probability of success.(computing an error function over a location space, and determining coordinates within the location space where the error function is minimized.).

Therefore it would have been an obvious to one of an ordinary skill in art, having the teachings of Anderson and Ahuja in front of him at the time of invention was made, to incorporate teachings of Ahuja as one of "LOCATION DETERMINATION MODULES" as part of the "tiered estimation of geolocation of the internet host employing a number of processes of Anderson as shown in Fig. 11 such that

estimation of the location of the internet host can be refined (corrected) as stated in Fig. 4A.

This would have been obvious because Ahuja states at col. 7, line 60-65, "Note that the topological location of an IP address can often be determined using the standard "traceroute" tool, which attempts to identify all of the router hops on a path selected to reach a destination. However, traceroute frequently provides incomplete information, particularly, because many routers do not respond to traceroute."

Referring to claims 18,

Keeping in mind the teachings of Ahuja as stated above for claim 17, Ahuja fails to teach wherein determining coordinates within the location space where the error function is minimized comprises minimizing the error function across a list of known city locations, and wherein providing the location estimate comprises providing the known city location corresponding with the minimum value of the error function.

Anderson, along with the teachings indicated for claim 17 above, teaches at col. 16, line 5-19, "Demographic/Geographic Data: Implicit in much of the decision making processes is information about the different locations of the world. The analysis module 28, in one embodiment, utilizes a demographic/geographic database 31, shown in FIGS. 1B and 2 to be part of the data warehouse 30, storing a city record for every city in the U.S.A. and all foreign cities with populations of greater than 100,000 people. Tied to each city are its state, country, continent, DMA (Designated Marketing Area), MSA (Metropolitan Statistical Area), PMSA (Primary Metropolitan Statistical Area), location latitude & longitude), sets of zip/postal codes, congressional districts, and area

codes. Each city record also has population and a connectivity index, which is based on the number of major carriers that have presence in that city."(determining coordinates within the location space where the error function is minimized comprises minimizing the error function across a list of known city locations, and wherein providing the location estimate comprises providing the known city location corresponding with the minimum value of the error function.)

Therefore it would have been an obvious to one of an ordinary skill in art, having the teachings of Anderson and Ahuja in front of him at the time of invention was made, to incorporate teachings of Ahuja as one of "LOCATION DETERMINATION MODULES" as part of the "tiered estimation of geolocation of the internet host employing a number of processes of Anderson as shown in Fig. 11 such that estimation of the location of the internet host can be refined (corrected) as stated in Fig. 4A.

This would have been obvious because Ahuja states at col. 7, line 60-65, "Note that the topological location of an IP address can often be determined using the standard "traceroute" tool, which attempts to identify all of the router hops on a path selected to reach a destination. However, traceroute frequently provides incomplete information, particularly, because many routers do not respond to traceroute."

Referring to claims 19, 20, 21, and 22,

Keeping in mind the teachings of Ahuja as stated above for claims 17 and 18, Ahuja fails to teach the method of claim 18, wherein computing the error function comprises using a weighted least mean squares algorithm to optimize the location

estimate., and the method of claim 18, wherein computing the error function comprises using a probability density estimation to optimize the location estimate, and the method of claim 18, wherein computing the error function comprises using a weighted least mean squares algorithm to prune a solution space, and using a probability density estimation to optimize the location estimate from the pruned solution space, and the method of claim 18, wherein computing the error function comprises using a probability density estimation to prune a solution space, and using a weighted least mean squares algorithm to optimize the location estimate from the pruned solution space.

Anderson, along with the teachings indicated for claims 17 and 18 above, teaches the method of claim 18, wherein computing the error function comprises using a weighted least mean squares algorithm to optimize the location estimate., and the method of claim 18, wherein computing the error function comprises using a probability density estimation to optimize the location estimate, and the method of claim 18, wherein computing the error function comprises using a weighted least mean squares algorithm to prune a solution space, and using a probability density estimation to optimize the location estimate from the pruned solution space, and the method of claim 18, wherein computing the error function comprises using a probability density estimation to prune a solution space, and using a weighted least mean squares algorithm to optimize the location estimate from the pruned solution space. (col. 27, line 52- col. 28, line 6, col. 2, line 42- col. 3, line 9, col. 14, line 25-40, col. 21, 53-56, col. 16, line 21-35, col. 14, line 25-35, col. 53, line 17-col. 54, line 5).

Therefore it would have been an obvious to one of an ordinary skill in art, having the teachings of Anderson and Ahuja in front of him at the time of invention was made, to incorporate teachings of Ahuja as one of "LOCATION DETERMINATION MODULES" as part of the "tiered estimation of geolocation of the internet host employing a number of processes of Anderson as shown in Fig. 11 of Anderson as shown in Fig. 11 such that estimation of the location of the internet host can be refined (corrected) as stated in Fig. 4A.

This would have been obvious because Ahuja states at col. 7, line 60-65, "Note that the topological location of an IP address can often be determined using the standard "traceroute" tool, which attempts to identify all of the router hops on a path selected to reach a destination. However, <u>traceroute frequently provides incomplete information,</u> particularly, because many routers do not respond to traceroute."

Referring to claim 27,

Ahuja teaches at teaches a method of determining the location of an Internet host using a first computer system comprising the following computes executable acts (Figs. 3-7) and clustering together IP addresses corresponding to hosts in the same geographic location according to network routing information to obtain cluster information (col. 10, line 8-39, "Furthermore, while the foregoing technique for inferring path characteristics is preferred, it will be appreciated that inferences can be made in other ways, including, but not limited to, the following:

1. Monitoring sets of prefixes and then treating all prefixes in the set in the same fashion..

2. Aggregating prefix sets based on similarities and treating all such aggregated prefix sets in the same fashion.

3. Deaggregating prefix sets into subsets that have similar characteristics and treating the subsets in the same fashion.

4. Placing prefixes into sets based on some criteria of similarity such as, but not limited to, performance, geographical location, and other correlation factors, and treating all prefixes in the sets in the same fashion.

Note that a set can be a single prefix, a group of prefixes, the union of two sets wherein the two sets are geographically close, the union of two sets wherein the two sets experience similar performance in relation to ASes, sets of sets and the like.

Lastly, additional improvements to the technique for inferring path characteristics described herein can include, but are not limited to, the following

1. Making the performance measurement over the same AS path as the AS path of the destination for which path characteristics are to be inferred.

2. Adding topology, as determined by traceroute, to the inference technique. In that event, each measurement can be weighted by the length of the path that is common to both the measured destination and to the destination for which the inference is being performed. (clustering together IP addresses corresponding to hosts in the same geographic location according to network routing information to obtain cluster information, Please note that "prefixes" are as at taught by Ahuja at col. 6, line 65-67, "However, routing on the Internet is specified at the granularity of subnetworks (also known as prefixes), which are ranges of IP addresses.")

Ahuja also teaches at col. 8, line 42-64, "Note that a tight upper bound of each distance will result in a smaller intersection region and hence a more precise estimate of the geographic location of the destination. In addition, adding more sources, especially ones that are geographically diverse with respect to the destination, will further reduce the **intersection region and increase the precision of the estimate**. In addition, making more measurements and selecting the lowest latency measurement will further decrease the size of the region of intersection. Furthermore, this method can be used both for specific IP addresses and for subnetworks, with the appropriate distance used in each case. Note also, that the sources used in these latency measurements for the purpose of identifying geographic location do not have to be the same sources that are used for monitoring performance and other path characteristics. Whereas the latencies that are collected for monitoring performance and other path characteristics need to be collected from the perspective of the AS that is using those measurements to make routing decisions, the geographic location of any IP address or subnetwork is not relative to the source, and so could be determined from the perspective of any AS." (computing a dispersion metric representative of the accuracy of the location estimate of the location of the Internet host.)

Ahuja fails to teach obtaining partial IP-to-location mapping information from a data source; obtaining network routing information; correlating the partial IP-to-location information with the cluster information providing a location estimate of the location of the Internet host according to the correlation of the partial IP-to-location information and

the cluster information; and computing a dispersion metric representative of the accuracy of the location estimate of the location of the Internet host.

Anderson teaches at col. 27, line 6-20 col. 38, line 27-57, "The method by which the Autonomous System Network (ASN) LDM 136 operates to identify one more geographic locations for network addresses (obtaining partial IP-to-location mapping information from a data source; obtaining network routing information), and to assign at least one confidence factor to each of the geographic locations, is similar to the methods 240 and 270 of other two internet registry LDMs (i.e., the Net LDM 132 and the DNS LDM 134). Specifically, as opposed to the deploying external data collection routines to gather Net and DNS records, the ASN LDM 136 deploys the external data collection routines to gather the Autonomous System data, and parse it for meaningful geographic data. If ASN data is available, then the ASN LDM 136 can run. (correlating the partial IP-to-location information with the cluster information) An exemplary collection of confidence maps that may be utilized by the ASN LDM 136 to attach confidence factors to location determinants are discussed below with reference to FIGS. 19A-19E. The confidence factors generated by the ASN LDM 136 come from distance to LKH and NKH, the size of the network, <u>the position in the traceroute</u>, population and [illegible]<u>nectivity</u>.) (providing a location estimate of the location of the Internet host [illegible] the correlation of the partial IP-to-location information and the cluster [illegible]

[illegible] ave been an obvious to one of an ordinary skill in art, having [illegible] Ahuja in front of him at the time of invention was

made, to incorporate teachings of Ahuja as one of "LOCATION DETERMINATION MODULES" as part of the "tiered estimation of geolocation of the internet host employing a number of processes of Anderson as shown in Fig. 11 of Anderson as shown in Fig. 11 such that estimation of the location of the internet host can be refined (corrected) as stated in Fig. 4A.

This would have been obvious because Ahuja states at col. 7, line 60-65, "Note that the topological location of an IP address can often be determined using the standard "traceroute" tool, which attempts to identify all of the router hops on a path selected to reach a destination. However, <u>traceroute frequently provides incomplete information,</u> particularly, because many routers do not respond to traceroute."

Referring to claims 28 and 29,

Ahuja teaches the method of claim 27, wherein obtaining network routing information comprises using a routing protocol, and the method of claim 28, wherein the routing protocol is one of BGP,R1P, OSPF, IGRP, and EGP. (col. 3, line 54-57, "Another object of the invention is to communicate routing information derived from optimized routing tables to BGP routers."

Referring to claim 30,

Ahuja teaches the method of claim 27, wherein clustering together IP addresses corresponding to hosts in the same geographic location according to network routing information to obtain cluster information comprises associating an address prefix used by a routing protocol with a geographical location. (col. 6, line 65-67, "However, <u>routing on the Internet</u> is specified at the granularity of <u>subnetworks (also known as prefixes),</u>

which are ranges of IP addresses.", col. 1, line 45-52, "Subnetting breaks up the address space into several subnetworks (which are identified by address prefixes), each of which represents a contiguous block of addresses. An AS contains a collection of subnets. Each such collection is disjoint in that a given prefix can be found in only one AS. The unique AS that contains a given prefix is responsible for delivering packets to all of the IP addresses in that prefix:)

Referring to claim 31, 32, 33 and 34,

Anderson teaches the method of claim 30, further comprising: sub-dividing the geographical location associated with the address prefix into at least two clusters according to a geographical spread associated with the geographical location., and the method of claim 27, further comprising sub-dividing the cluster information according to a geographical spread associated with the geographical location, and the method of claim 27, further comprising selectively providing the location estimate if the dispersion metric is less than a threshold value, and the method of claim 33, further comprising a threshold value that is dependent on the size of the cluster.(col. 10, line 8-39, "Furthermore, while the foregoing technique for inferring path characteristics is preferred, it will be appreciated that inferences can be made in other ways, including, but not limited to, the following:

1. Monitoring sets of prefixes and then treating all prefixes in the set in the same fashion..

2. Aggregating prefix sets based on similarities and treating all such aggregated prefix sets in the same fashion.

3. Deaggregating prefix sets into subsets that have similar characteristics and treating the subsets in the same fashion.

4. Placing prefixes into sets based on some criteria of similarity such as, but not limited to, performance, geographical location, and other correlation factors, and treating all prefixes in the sets in the same fashion.

Note that a set can be a single prefix, a group of prefixes, the union of two sets wherein the two sets are geographically close, the union of two sets wherein the two sets experience similar performance in relation to ASes, sets of sets and the like (sub-dividing the geographical location associated with the address prefix into at least two clusters according to a geographical spread associated with the geographical location., and the method of claim 27, further comprising sub-dividing the cluster information according to a geographical spread associated with the geographical location)

Lastly, additional improvements to the technique for inferring path characteristics described herein can include, but are not limited to, the following

1. Making the performance measurement over the same AS path as the AS path of the destination for which path characteristics are to be inferred.

2. Adding topology, as determined by traceroute, to the inference technique. In that event, each measurement can be weighted by the length of the path that is common to both the measured destination and to the destination for which the inference is being performed. Please note that "prefixes" are as at taught by Ahuja at col. 6, line 65-67, "However, routing on the Internet is specified at the granularity of subnetworks (also known as prefixes), which are ranges of IP addresses.")

Ahuja also teaches at col. 8, line 42-64, "Note that a tight upper bound of each distance will result in a smaller intersection region and hence a more precise estimate of the geographic location of the destination. In addition, adding more sources, especially ones that are geographically diverse with respect to the destination, will further reduce the **intersection region and increase the precision of the estimate**. In addition, making more measurements and selecting the lowest latency measurement will further decrease the size of the region of intersection. Furthermore, this method can be used both for specific IP addresses and for subnetworks, with the appropriate distance used in each case. Note also, that the sources used in these latency measurements for the purpose of identifying geographic location do not have to be the same sources that are used for monitoring performance and other path characteristics. Whereas the latencies that are collected for monitoring performance and other path characteristics need to be collected from the perspective of the AS that is using those measurements to make routing decisions, the geographic location of any IP address or subnetwork is not relative to the source, and so could be determined from the perspective of any AS.", col. 10, line 5-7, "The relative size of the "out-of-sample" data can be decreased until the root-mean-square (RMS) of the error is within an acceptable threshold.")(selectively providing the location estimate if the dispersion metric is less than a threshold value, and the method of claim 33, further comprising a threshold value that is dependent on the size of the cluster.)

Referring to claim 35,

Keeping in mind the teachings of Ahuja as stated above for claim 27, Ahuja fails to teach the method of claim 27, further comprising: obtaining route information relating to a first network path between a host IP address associated with the Internet host and the first computer system, wherein the first network path comprises the first computer system, the Internet host, and at least one intermediate network mode, and wherein the route information comprises a plurality of router labels associated with the host IP address and the at least one intermediate network node; extracting a first location code from the route information corresponding to a router label associated with one of the internet host and an intermediate network node proximate the Internet host; consulting a data store comprising at least one data set having location codes and corresponding location information; obtaining first location information from the data store corresponding to the first location code associated with the one of the Internet host and the intermediate network node proximate the Internet host; and providing a first location estimate of the location of the Internet host according to the first location information from the data store corresponding to the first location code.

Anderson teaches obtaining route information (col. 15, line 32, "As described above, each of the data collection agents 18 may implement one of multiple data collection processes to obtain raw geolocation information. These data collection processes may, in one exemplary embodiment of the present invention, access any one or more of the following data sources:") relating to a first network path between a host IP address associated with the Internet host and the first computer system, wherein the first network path comprises the first computer system, the Internet host, and at least

one intermediate network node (col. 15, line 55-60, "Traceroute: A traceroute shows the route of a data packet from a data collection machine to a target host. Much information can be derived from the analysis of a traceroute. For instance, if hop #10 is in California, and hop #13 is in California, then with increased certainty, it can be inferred that hops #11 and #12 are also in California."), and wherein the route information comprises a plurality of router labels associated with the host IP address and the at least one intermediate network node (col.8, line 14-20, "Typically, most network addresses (e.g., IP addresses) are associated with a particular geographic location. This is because routers that receive packets for a particular set of machines are fixed in location and have a fixed set of network addresses for which they receive packets. The machines that routers receive packets for tend to be geographically proximal to the routers.");

extracting a first location code from the route information corresponding to a router label associated with one of the Internet host and an intermediate network node proximate the Internet host (col. 52, line49-col. 53, line 16, "EXAMPLE 1 The last four hops in a traceroute form a <u>distal-proximal</u> relationship, meaning that the next hop is geographically closer to its next successive hop: <u>Hop 5 is closer to hop 6 Hop 6 is closer to hop 7 Hop 7 is closer to hop 8</u> Thus, the traced route geographically progresses toward the final hop 8, leading to a decision that the destination is located within a certain range of accuracy. EXAMPLE 2 The point of origin is Denver, Colo., and the destination is Salt Lake City, Utah. The last four hops indicate a connection that is back-hauled through Denver, Colo., essentially geographically backtracking the route

taken: 1 Denver Router 2 Grand Junction Router 3 Provo Utah Router 4 Salt Lake City Router 5 Salt Lake City Router 6 Denver Router 7 Provo Utah Router 8 Salt Lake City Router 9 Salt Lake City Destination This example indicates a geographic progression away from Denver toward Utah, directly back to Denver, and finally directly back to Utah with a destination that does not leave Utah. Thus, a human may assume that even though the route taken was very indirect, it did terminate in Utah. Using Latitude/Longitude coordinates, the data collection agents 18 will see the same scenario and arrive at an intelligent conclusion.")

consulting a data store comprising at least one data set having location codes and corresponding location information (Fig. 1A, elements 26 and 30, col. 10, line 39-42, "If the search was successful, this information will be placed directly into the <u>data collection database 26</u>, at which time the analysis module 28 will <u>determine</u> an estimated geolocation of the searched addresses.");

obtaining first location information from the data store corresponding to the first location code associated with the one of the Internet host and the intermediate network node proximate the Internet host (col.8, line 14-31, " For example, a traceroute search is conducted by a data collection agent 18 responsive to a search request received at a data collection agent 18 from a data collection broker 22. Each data collection agent 18, responsive to a request, will perform a search (e.g., <u>a traceroute</u>) to collect specified data, and determine the validity of the raw data utilizing built-in metrics. If successful, <u>this data is provided to the data collection database 26</u>, via a data collection broker 22, <u>for analysis by the analysis module 28.</u> Each data collection agent 18 further advises a

controlling data collection broker 22 of the success or failure of a particular search." Note: Database 26 of Fig. 2 has location information provided by collection agents along with it's metrics.);

providing a first location estimate of the location of the Internet host according to the first location information from the data store corresponding to the first location code (col. 15, line 27-29, "As described above, each of the data collection agents 18 may implement one of multiple data collection processes to obtain raw geolocation information.", col. 14, line 1-3, ""Each data collection broker 22 further stores raw data (geolocation information) into the data collection database 26,.")

Therefore it would have been an obvious to one of an ordinary skill in art, having the teachings of Anderson and Ahuja in front of him at the time of invention was made, to incorporate teachings of Ahuja as one of "LOCATION DETERMINATION MODULES" as part of the "tiered estimation of geolocation of the internet host employing a number of processes of Anderson as shown in Fig. 11 such that estimation of the location of the internet host can be refined (corrected) as stated in Fig. 4A.

This would have been obvious because Ahuja states at col. 7, line 60-65, "Note that the topological location of an IP address can often be determined using the standard "traceroute" tool, which attempts to identify all of the router hops on a path selected to reach a destination. However, traceroute frequently provides incomplete information, particularly, because many routers do not respond to traceroute."

Referring to claim 36,

Ahuja teaches at

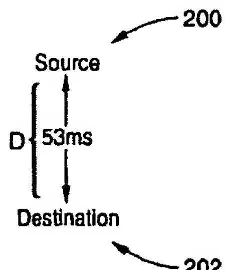

FIG. 3

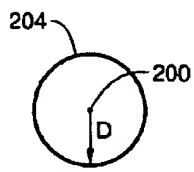

FIG. 4

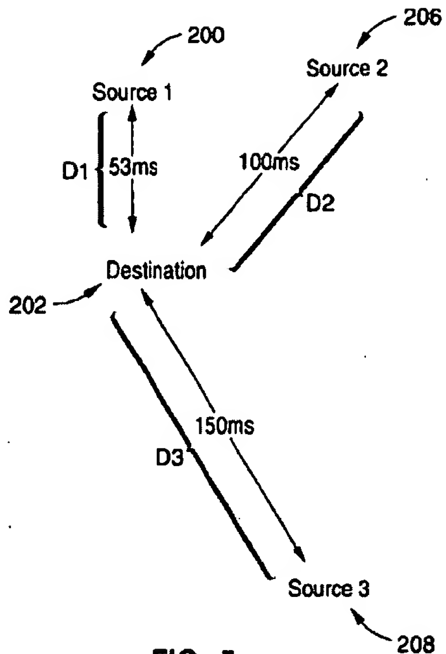

FIG. 5

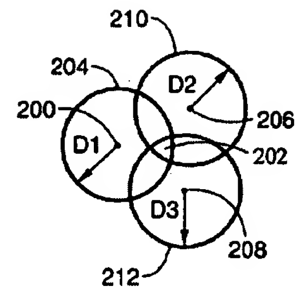

FIG. 6

teaches a computer implemented method of determining the location of an Internet host using a first computer system (Fig. 5, element 200), comprising the following computer executable acts:

measuring a first delay time (Fig.5, element 53 ms) relating to a transmission from the first computer system to receipt of the transmission at the Internet host alone a first network path between a host IP address (Fig. 5, element 202) associated with the Internet host and the first computer system (col. 8, line 31-33, "For example, FIG. 5 shows three sources 200, 206, 208 having distance estimates D1, D2, and D3 to destination 202, respectively.");

measuring a second delay time (Fig. 5, element 100ms) relating to a transmission from a second computer system (Fig.5, element 206) to receipt of the

transmission at the Internet host along a second network path between the host IP address (Fig. 5, element 202) and the second computer system (col. 8, line 31-33, "For example, FIG. 5 shows three sources 200, 206, 208 having distance estimates D1, D2, and D3 to destination 202, respectively.");

measuring a third delay time (Fig. 5, element 150ms) relating to a transmission from a third commuter system (Fig.5, element 208) to receipt of the transmission at the Internet host along a third network path between the host IP address (Fig. 5, element 202) and the third computer system (col. 8, line 31-33, "For example, FIG. 5 shows three sources 200, 206, 208 having distance estimates D1, D2, and D3 to destination 202, respectively."); at least one of the first. second, and third network -paths containing at least one intermediate node; (col. 8, line 10-15, "For example, in fiber-optic cables, packets are known to travel at roughly two-thirds the speed of light in a vacuum. This rate will be affected by several factors including changes in the physical medium, curvature in the network paths, and latency added by routers or other devices.")

correlating the first, second, and third delay times; and providing a location estimate of the location of the Internet host according to the correlation of the first, second, and third delay times. (Figs. 6 and 7, col.8, line 33-41, "The source locations and distance estimates can be used to define intersecting circles 204, 210, 212, respectively, as shown in FIG. 6. If all of the distance estimates are upper bounds on the actual distances, then the destination must lie within the intersection of all such circles. This is also illustrated in FIG. 6, wherein destination 202 lies within the

intersection of circles 204, 210, 212. Note, that the diameters of circles 204, 210, 212 are not drawn proportionally in this example.")

Referring to claim 37,

Ahuja teaches at

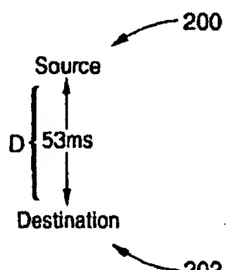

FIG. 3

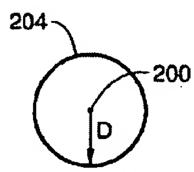

FIG. 4

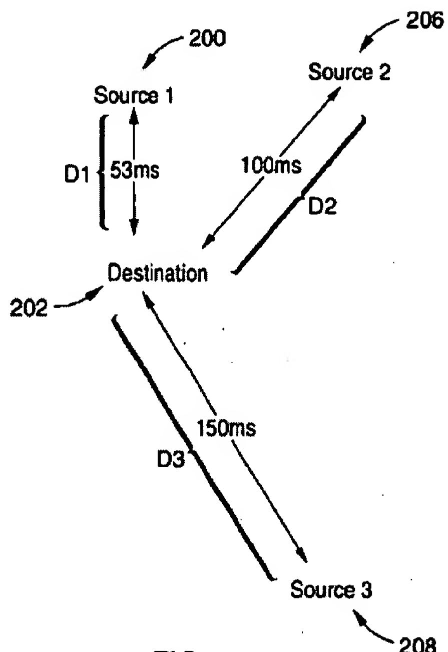

FIG. 5

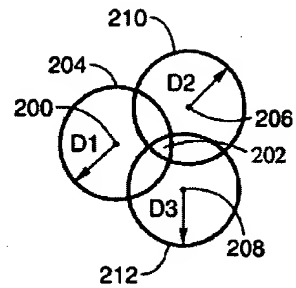

FIG. 6

teaches a computer implemented method of determining the location of an Internet host using a first computer system (Fig. 5, element 200), comprising the following computer executable acts:

measuring a first delay time (Fig.5, element 53 ms) relating to a transmission from the first computer system to receipt of the transmission at the Internet host alone a first network path between a host IP address (Fig. 5, element 202) associated with the Internet host and the first computer system (col. 8, line 31-33, "For example, FIG. 5

shows three sources 200, 206, 208 having distance estimates D1, D2, and D3 to destination 202, respectively.");

measuring a second delay time (Fig. 5, element 100ms) relating to a transmission from a second computer system (Fig.5, element 206) to receipt of the transmission at the Internet host along a second network path between the host IP address (Fig. 5, element 202) and the second computer system (col. 8, line 31-33, "For example, FIG. 5 shows three sources 200, 206, 208 having distance estimates D1, D2, and D3 to destination 202, respectively.");

measuring a third delay time (Fig. 5, element 150ms) relating to a transmission from a third commuter system (Fig.5, element 208) to receipt of the transmission at the Internet host along a third network path between the host IP address (Fig. 5, element 202) and the third computer system (col. 8, line 31-33, "For example, FIG. 5 shows three sources 200, 206, 208 having distance estimates D1, D2, and D3 to destination 202, respectively."); at least one of the first. second, and third network -paths containing at least one intermediate node; (col. 8, line 10-15, "For example, in fiber-optic cables, packets are known to travel at roughly two-thirds the speed of light in a vacuum. This rate will be affected by several factors including changes in the physical medium, curvature in the network paths, and latency added by routers or other devices.")

correlating the first, second, and third delay times; and providing a location estimate of the location of the Internet host according to the correlation of the first, second, and third delay times. (Figs. 6 and 7, col.8, line 33-41, "The source locations and distance estimates can be used to define intersecting circles 204, 210, 212,

respectively, as shown in FIG. 6. If all of the distance estimates are upper bounds on the actual distances, then the destination must lie within the intersection of all such circles. This is also illustrated in FIG. 6, wherein destination 202 lies within the intersection of circles 204, 210, 212. Note, that the diameters of circles 204, 210, 212 are not drawn proportionally in this example.")

Referring to claim 38,

Claim 38 is a claim to a software tool for carrying out the method steps of claim 27. Therefore claim 38 is rejected for the reasons set forth for claims 27, 33 and 34.

Referring to claim 39,

Claim 39 is a claim to a computer-readable medium having computer executable instructions for carrying out the method steps of claim 27. Therefore claim 39 is rejected for the reasons set forth for claims 27, 33 and 34.

Referring to claim 40,

Claim 40 is a claim to a system for carrying out the method steps of claim 27. Therefore claim 40 is rejected for the reasons set forth for claims 27, 33 and 34.

Referring to claim 41,

Claim 41 is a claim for geographical location estimate data associated with an Internet host, the estimate data resulting from a process that includes the method of claim 27. Therefore claim 41 is rejected for the reasons set forth for claims 27, 33 and 34.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless-

> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

10. Claims 12, 13 and 23-26 are rejected under 35 U.S.C. 102(e) as being anticipated by Ahuja et al. (hereinafter Ahuja) (US 6, 981, 055 B1)

Referring to claim 12,

Ahuja teaches at

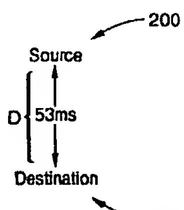

FIG. 3

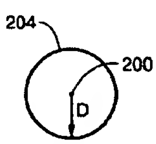

FIG. 4

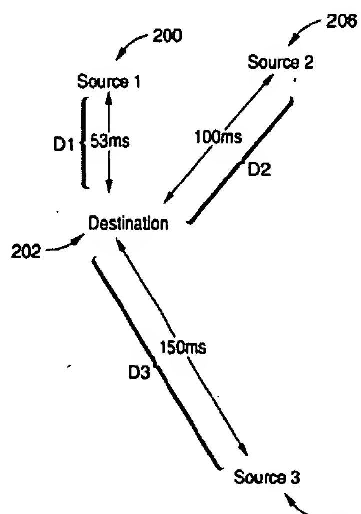

FIG. 5

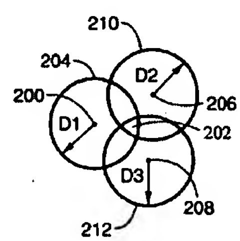

FIG. 6

teaches a computer implemented method of determining the location of an Internet host using a first computer system (Fig. 5, element 200), comprising the following computer executable acts:

measuring a first delay time (Fig.5, element 53 ms) relating to a transmission from the first computer system to receipt of the transmission at the Internet host alone a first network path between a host IP address (Fig. 5, element 202) associated with the

Internet host and the first computer system (col. 8, line 31-33, "For example, FIG. 5 shows three sources 200, 206, 208 having distance estimates D1, D2, and D3 to destination 202, respectively.");

measuring a second delay time (Fig. 5, element 100ms) relating to a transmission from a second computer system (Fig.5, element 206) to receipt of the transmission at the Internet host along a second network path between the host IP address (Fig. 5, element 202) and the second computer system (col. 8, line 31-33, "For example, FIG. 5 shows three sources 200, 206, 208 having distance estimates D1, D2, and D3 to destination 202, respectively.");

measuring a third delay time (Fig. 5, element 150ms) relating to a transmission from a third commuter system (Fig.5, element 208) to receipt of the transmission at the Internet host along a third network path between the host IP address (Fig. 5, element 202) and the third computer system (col. 8, line 31-33, "For example, FIG. 5 shows three sources 200, 206, 208 having distance estimates D1, D2, and D3 to destination 202, respectively."); at least one of the first. second, and third network -paths containing at least one intermediate node; (col. 8, line 10-15, "For example, in fiber-optic cables, packets are known to travel at roughly two-thirds the speed of light in a vacuum. This rate will be affected by several factors including changes in the physical medium, curvature in the network paths, and latency added by routers or other devices.")

correlating the first, second, and third delay times; and providing a location estimate of the location of the Internet host according to the correlation of the first, second, and third delay times. (Figs. 6 and 7, col.8, line 33-41, "The source locations

and distance estimates can be used to define intersecting circles 204, 210, 212, respectively, as shown in FIG. 6. If all of the distance estimates are upper bounds on the actual distances, then the destination must lie within the intersection of all such circles. This is also illustrated in FIG. 6, wherein destination 202 lies within the intersection of circles 204, 210, 212. Note, that the diameters of circles 204, 210, 212 are not drawn proportionally in this example.")

Referring to claim 13,

Ahuja teaches the method of claim 12, wherein correlating the first, second; and third delay times comprises triangulating the first, second, and third delay measurements. . (This is also illustrated in FIG. 6, wherein destination 202 <u>lies within the intersection of circles</u> 204, 210, 212. Note, that the diameters of circles 204, 210, 212 are not drawn proportionally in this example." Note the boundaries created by the intersections of circles is triangle as shown in Fig.6 pointing the location of source 202.)

Referring to claim 23,

Claim 23 is a claim to a software tool for carrying out the method steps of claim 12. Therefore claim 23 is rejected for the reasons set forth for claim 12.

Referring to claim 24,

Claim 24 is a claim to a computer-readable medium having computer executable instructions for carrying out the method steps of claim 12.. Therefore claim 24 is rejected for the reasons set forth for claim 12.

Referring to claim 25,

Claim 25 is a claim to a system for carrying out the method steps of claim 12. Therefore claim 25 is rejected for the reasons set forth for claim 12.

Referring to claim 26,

Claim 26 is a claim for geographical location estimate data associated with an Internet host, the estimate data resulting from a process that includes the method of claim 12. Therefore claim 26 is rejected for the reasons set forth for claim 12.

Conclusion

Examiner's note: Examiner has cited particular columns and line numbers in the references as applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to the specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant in preparing responses, to fully consider the references in entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ashok B. Patel whose telephone number is (571) 272-3972. The examiner can normally be reached on 6:30 am-4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan A. Flynn can be reached on (571) 272-1915. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

NATHAN J. FLYNN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800

*ABP**